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1.0 INTRODUCTION

1.1 Changes from Basis of Design Report

Since the Final Basis of Design Report (BODR, April 2006), the purchase of approximately 960 acres constituting the Star Farms/Minton property located at the northeast quarter of the project site had an impact on the functional layout of the Project site (refer to Figure 1.1). This action affected many Project elements including, Reservoir shape, Stormwater Treatment Area (STA) Cell size and shape, number of STA Cells and associated structures, and redirection of the STA seepage collection canal and distribution canal. The following are modifications to the Project related to the Reservoir and STA Cells since the BODR as a result of the land purchase as well as other design changes:

- The intake canal has been modified since the BODR. To accommodate maintenance activities and vehicles within Easement No. 5, the intake canal bottom width has been reduced from 40 feet to 30 feet. As the canal proceeds north beneath Citrus Boulevard, the cross-section changes to vertical walls and a bottom width of 55 feet to reduce the length of the new Citrus Boulevard bridge structure. A transition to a bottom width of 60 feet occurs north of the bridge and continues to the Project pump station intake.

- The Reservoir was reconfigured to be more rectangular in shape, eliminating the indention at the northeast corner that was in the Final BODR. The eastern embankment alignment was adjusted to provide a reservoir wetted-area of approximately 3,400 acres.

- The southeast corner of the Reservoir has been modified to accommodate the pump station layout.

- As part of the shape reconfiguration of the Reservoir, the internal dike identified in the BODR has been eliminated from the Reservoir design.

- The bottom elevation of the Reservoir seepage collection canal has been modified from 10 ft NAVD 88 to 12 ft NAVD 88 since the BODR and the bottom width has been modified from 20 feet to 10 feet. The canal's hydraulic conveyance of stormwater runoff from the Reservoir embankment and the C-23 Basin off-site inflows is not impacted.

- Select Unit C shelly sand (designated as Soil Type 2 on the drawings) can be used in lieu of imported sand for the embankment chimney drain provided the material has fines content less than 5 percent and a minimum hydraulic conductivity of 28 feet per day.

- An embankment cross-section that includes a geomembrane seepage control system is no longer considered to be a cost-effective construction alternative.

This is based on the preliminary results from the Reservoir Test Cell evaluation that indicates lower seepage losses than previously modeled.

- In regards to establishing the embankment crest elevation, the alternative of flat-plate soil-cement protection for the entire upstream slope is not considered to be cost-effective. Similarly, the use of an upstream bench to reduce wave run-up is also not considered to be cost-effective. As such, these alternatives are no longer being considered.

- For the Reservoir seepage collection canal, a layer of filter material along the canal bottom and side slopes was added to reduce the hydraulic exit gradient, thereby increasing the factor of safety against piping. On-site select Unit C material as described above for the embankment drainage system can be used for this application.

- Additional seepage analyses utilizing the numerical model SEEP/W were performed in order to evaluate model sensitivity, using hydraulic conductivity values ranging from 16 to 55 feet per day for Unit C and 0.28 to 1.4 feet per day for Unit A+B (designated as Soil Type 1 on the drawings). Results are similar to previous analyses, with increases in total seepage losses, as expected for higher hydraulic conductivity values.

- The Reservoir discharge structure has been relocated from the position shown in the BODR to a location near the northeast corner of the Reservoir, resulting in a significant distance between the discharge from the Reservoir pump station into the Reservoir and the outflow point of the Reservoir.

- The distribution canal path has been redirected through the site based on modifications made to the layout of the Reservoir and STA cells. The distribution canal bottom was lowered from 19.5 ft NAVD 88 to 18.5 ft NAVD 88.

- A 60-ft spillway is located at the end of the distribution canal near at the southeast corner of STA Cell 3. The spillway crest elevation is set at 28.8 NAVD 88. A larger spillway located at the southeast corner of the Reservoir with discharge to the intake canal was previously presented in the BODR.

- Along the Florida Power & Light (FPL) north-south easements within the Project, a drainage canal on the east side of the FPL easement is proposed. This canal is designed to take stormwater runoff falling within the easement, split the flow at the distribution canal with flow being directed both north and south. Each canal conveys water into the STA seepage collection canal system.

- The entrance of the project access road has been moved to the east to meet the requirements of Martin County. A minimum road centerline-to-centerline distance of 660 feet from the access road currently being used by TIWCD and the new project access road is indicated on the Project plans.

- The size, shape and orientation of the STA cells have been modified.
- The number of the STA cells on the project has been reduced from eight cells to seven cells. Treatment area has not been reduced.
- The number of STA cell water control inlet and outlet structures has been modified to function properly with the reconfiguration of the STA cells.
- The equalization basins downstream of the STA outlet weirs have been eliminated and replaced with a spillway and twin 4'x4' outlet box culverts that transmit water from each STA cell into the STA seepage collection canal.
- The reconfiguration of the Reservoir and STA cell components required the STA seepage collection canal be re-routed.
- The STA seepage collection canal cross-section has been modified since the BODR. The bottom width of the canal varies from 10 feet in width at the north (upstream end) of the canal to 25 feet wide as the canal proceeds east and then south along the eastern property boundary to 60' wide at the southern end of the Project site where it flows into the STA system discharge structure at the Western Outlet Canal (Easement 3).
- All operational system flows and site stormwater runoff flows are controlled via a gated structure and spillway on the Western Outlet Canal located within Easement No. 3. The existing USACE "Mid" Spillway will be used to discharge the flows to the C-44 Canal.
- The eastern drainage canal has been sized to accommodate the pre-development off-site flows and route the flows along the eastern property boundary to the southeast corner of the project site. The canal will proceed under Citrus Boulevard through a new box culvert and into the C-44 Canal via a concrete spillway (broad-crested weir) discharge structure at Easement 1.
- No work is planned within Easement No. 2.

1.2 Reservoir and Intake Canal Details

1.2.1 Configuration

As part of the shape reconfiguration of the Reservoir, the internal dike identified in the BODR has been eliminated from the Reservoir design. Wave generation and resulting run-up effects were analyzed to determine if the embankment crest height required modification, as well as conducting in-reservoir water quality modeling. It was confirmed that the deletion of the internal dike will not cause any adverse effects or changes to the Reservoir embankment design.

The Reservoir discharge structure was relocated from the position shown in the BODR to a location farther to the north (Figure 1.1). This has the net effect of increasing the distance between the point of discharge from the Reservoir pump station to the outflow point of the Reservoir, which facilitates the removal of the dike as discussed above.

Perimeter roads, located at the crest of the embankment and at the outside toe of slope of the Reservoir, have been included in the design for access and maintenance purposes. Turnarounds along the crest perimeter road have been incorporated into the design to accommodate two-way traffic in accordance with DCM-4, Minimum Dimensions of Dams and Embankments. Three access ramps descending into the Reservoir will be utilized as entry points for maintenance and repair.

A project access road runs parallel to the Intake Canal along its entire length. This road is a paved two-lane travel way that extends from Citrus Boulevard at the south to the Main Project Pump Station at the northern terminus. The access road will be elevated above adjacent finish grades and have its own drainage system. The access road was elevated to allow disposal of the intake canal excavation material (short haul distance).

1.2.2 Embankment Design

Wave Run-Up

During Preliminary Design, various embankment cross-sections were analyzed for wave run-up to determine the overall crest height and the optimal configuration of run-up reduction alternatives. The following were evaluated: 25 ft wide internal bench, flat-plate soil-cement in place of stair-steps.

A 25 ft wide internal bench at 4 different elevations (41.0, 43.7, 45.5, and 46.4 ft) was evaluated for wave run-up reduction potential. Although the bench reduces run-up, the amount of material (embankment fill and soil-cement) required to create the bench is not a cost effective balance versus the overall reduction in embankment height. As such, this alternative is no longer being considered.

Wave run-up was also analyzed to determine whether stair-step or complete flat-plate soil-cement facing is more cost effective. Stair-steps run from Normal Full Storage Level (NFSL) at EL +41.0 ft to the embankment crest. If the entire upstream embankment surface is protected with flat-plate soil-cement the wave run-up increases over 4 ft. Therefore the Reservoir embankment crest height increases 4 ft, which results in embankment total construction costs that exceeds the cost of a lower crest height with stair-steps. Despite the additional costs associated with stair-step construction (i.e. labor and materials), it does not outweigh the cost of a higher embankment. As such, the flat-plate only soil-cement alternative is no longer being considered.

To address potential erosion of the embankment toe due to rainfall run-off down the upstream slope during low-level reservoir storage, the upstream toe of the flat-plate soil-cement will extend to EL +22.0 ft, which is approximately 4 ft below the finished ground surface.

Embankment Borrow

Borrow for the Reservoir embankment may come from excavation of the seepage collection canal as well as the interior of the Reservoir. The borrow excavation on the interior will be limited to approximately 4 ft in depth (EL +22 ft) and will be no closer than 200 ft from the upstream toe. Earthwork calculations estimate the interior borrow area will be approximately 500 ft wide running parallel to the embankment.

Seepage Analyses

During Preliminary Design, hydraulic conductivity values utilized for seepage analyses were reevaluated. A range of values for Unit A+B (silty and/or clayey sand) and Unit C (shelly sand) were used to represent the range of possible in-situ conditions encountered at the site. Unit A+B k-values were varied from 0.28 ft/day to 1.4 ft/day. These values are based on laboratory testing. Unit C k-values were varied from 16.0 ft/day to 55.0 ft/day. These values were based on laboratory testing, in-situ slug tests, and literature review. Seepage loss estimates from SEEP/W modeling indicate approximately 14 cfs (29 ac-ft per day) of seepage will be lost from the Reservoir (Unit A+B Kh = 0.28 ft/day, Unit C Kh = 55 ft/day). This modeling assumes storage at NFSL. Actual losses will be less because the Reservoir will not always be at NFSL.

Losses from the total STA Cell area based on the modeling results are approximately 53.5 cfs (104.8 ac-ft per day) (Unit A+B Kh = 0.25 ft/day, Unit C Kh = 55 ft/day). The majority of the STA losses occur along the eastern portion of the project site where the eastern drainage canal runs parallel to the STA Seepage Collection canal. Losses here are nearly 70% of the total STA losses, and are attributed to the low stage of the eastern drainage canal (EL +17.0 ft) and the close proximity to STA Cells 4 through 7 (water surface EL +27.5 ft) and the STA seepage collection canal. Losses to the eastern drainage canal are only a concern during drought periods when hydration to the STAs will be an issue. This canal will be further evaluated during the Intermediate Design Phase to mitigate complications with STA hydration during drought periods.

The increase in hydraulic conductivity values incorporated into the seepage analyses brought out exit gradient concerns at the Reservoir seepage collection canal. In instances where the hydraulic conductivity value of the Unit A+B material was at the higher end of the range (1.4 ft/day), paired with lower range Unit C values (16 ft/day), exit gradients reached 0.55 or higher. This resulted in factors of safety against piping and erosion of less than 2. Although this combination of soil conditions is not anticipated to be continuous throughout the site, it is considered to be a potential condition in some areas. To increase the factor of safety, a filter layer will be added to the entire length of the Reservoir seepage collection canal's wetted perimeter. This material will be select shelly sand (Unit C) found on-site and will be obtained from the intake canal excavation. Seepage analyses indicate that the select Unit C material (hydraulic conductivity values 28.0 ft/day or higher) effectively reduces the exit gradients to 0.25. The factor of safety associated with an exit gradient of 0.25 is 3.6.

The use of a geomembrane within the Reservoir embankment as a means to reduce seepage losses through the embankment is no longer considered an alternative. Based on preliminary observations from the Test Cell site, actual seepage losses from the Reservoir Test Cells are less than those modeled. Based on these findings, the cost of the materials and labor to install the geomembrane are no longer considered cost effective.

Embankment Drains

Unit C material (shelly sand) excavated from Project canals may be used as fill for the chimney (vertical) portion of the embankment internal drain provided the material has a fines content of less than 5 % and a minimum hydraulic conductivity of 28 ft/day. Although the carbonate content of the material is higher than desirable, the rate of degradation of the material will be low because of the low seepage rates in the chimney drain; under normal conditions the phreatic surface in the embankment is below the chimney drain, therefore there should be no seepage into the chimney drain. The purpose of the chimney drain is to intercept seepage if in the unlikely event vertical cracks in the embankment should form.

The pipes for the internal embankment drain will be 6 inch diameter slotted pipe placed parallel to the embankment with a drop of 0.4% for drainage. Outlet pipes will be solid and will be placed perpendicular to the embankment every 400 ft. The spacing of the outlet pipes is to allow for cleaning and inspection of the pipes by remote control.

Additional Reservoir embankment settlement analyses were performed along the northern embankment below which a weak 5 ft thick clayey layer was discovered at a depth of approximately 50 ft; the soil was conservatively assumed to be normally consolidated. This approach yields potential settlement of approximately 0.7 ft; this settlement should occur during construction (settlement gages will be installed beneath the embankment to monitor the settlement). Attempts to obtain undisturbed Shelby tube samples of this material were unsuccessful due to the intermittent presence of shelly material. This clay layer will continue to be investigated and its effects evaluated during the Intermediate Design Phase.

Crest Width

The embankment crest width shown on the drawings is 16 ft. At the BODR Technical Review Board Meeting, it was requested that a cost analysis be performed comparing the cost of a 16-ft wide embankment crest to a 12-ft wide embankment crest. For the case of the 12-ft wide crest, additional exterior ramps would be required to improve the access to the embankment crest. There are six exterior ramps shown on the drawings with a maximum spacing of about 2 miles between ramps. For a 12-ft wide crest, this spacing was reduced to 0.5 miles resulting in the addition of 8 ramps.

The embankment construction cost is reduced by $960,000 if the crest width is reduced from 16 ft to 12 ft. The cost for each exterior ramp is approximately $167,000; the cost for eight ramps is $1,336,000. Therefore, to reduce the embankment crest width from 16 ft to 12 ft would increase the embankment construction cost by $376,000. The addition of six ramps would be approximately the cost to reduce the crest width from 16 ft to 12 ft.

1.3 Stormwater Treatment Area Cells Details

Design components developed as part of the treatment system are listed below:

- STA Cell Gated Inlet Structures
- STA Cell Weir Outlet Structures
- STA Cell Low-Level Gated Outlet Structures
- STA Cell Seepage Collection Canal
- Site Drainage Canals
- System Discharge Structures
- Eastern Drainage Canal
- Eastern Outlet Canal and Discharge Structure

Some of the components of the STA Cell system have been modified and are noted below.

Each STA Cell has a gated inlet structure consisting of a pipe culvert to distribute water into each STA Cell interior. The structures are based on District design guidelines for gated structures.

STA Outlet Structures

Discharge from each STA Cell is controlled by paired-sets of concrete broad crested weirs and attached stainless steel weir plates equally spaced across the downstream end of the STA Cell. Every STA Cell contains the same number of outlet control structures as inlet structures. Each pair of 20-foot wide weir plate sections are set at crest elevation of 26.75 (NAVD 88) to maintain hydration within the STA Cell. This crest elevation may change based on the final grading plan developed for the STA Cells. Water flows out of each weir structure into twin 4’x4’ box culverts that transport the water into the adjacent STA seepage collection canal.

In the event that the STA cells need to be completely drained as part of a planned maintenance program or required by operations, one low-level gated outlet structure has been designed for each STA Cell. This structure is similar in size and function as the STA cell gated inlet structures and is designed using District design guidelines for gated structures.

STA Seepage Collection Canal

The STA seepage collection canal is located at the downstream end of each STA Cell and runs along the north property boundary to the eastern perimeter of the site, ultimately discharging into the C-44 Canal at Easement No. 3 (western outlet canal). An additional segment of the canal routes water from STA Cell 2 to the western outlet canal. This seepage collection canal is designed and sized to collect the discharge from the STA Cells and routed stormwater flows through the STA Cells.

FPL Drainage Canals

Florida Power & Light (FPL) has existing easements for electric transmission power, within the C-44 Project site. The easements run north-south through the center of the site and east-west along the southern boundary of STA Cell 2 approximately 2 miles north of Citrus Boulevard. Stormwater runoff will be collected from these easements and directed to new drainage canals which, in turn, will convey the stormwater into the STA Cell seepage collection canal system.

System Outlet Structure

After treatment in the individual STA Cells and delivery into the STA seepage collection canal, water is discharged into the C-44 Canal. All system flows, as well as stormwater runoff, are controlled via the main discharge outlet for the C-44 Project through a dual-purpose system discharge structure comprised of a gated structure and a broad-crested discharge spillway. The structure is located south of STA Cell 7 on the western outlet canal, north of the existing Citrus Boulevard Bridge and about 2.5 miles east of Minute Maid Road. The purpose of this discharge structure is to control the flow from the STA Cell system, while at the same time maintaining water surface elevations within the STA seepage collection canal. The two bay vertical roller gate discharge structure is designed for normal discharge flows of less than or equal to 600 cfs. System flows and stormwater runoff that exceed 600 cfs will be routed across the concrete broad-crested spillway into the C-44 Canal.

Off-Site Runoff

Off-site stormwater runoff from the area north of Bar-B Ranch, and from Bar-B Ranch specifically, currently drains through an existing drainage canal running through STA Cell 4 through 7. This existing canal will be removed to allow for construction of the Project STA cells. Therefore, this off-site drainage flow will be diverted to the east into a newly constructed eastern drainage canal. The new canal will be sized to accommodate all of the off-site flows and will route them along the eastern property boundary to the southeast corner of the project site. At this point, the canal will proceed under Citrus Boulevard through a new box culvert and into C-44 Canal via a concrete broad-crested weir and spillway discharge structure.

STA Grading

The STA cells will be graded so that the water depth is generally between 1.25 to 3.0 ft. For the Preliminary Design Submittal, a detailed analysis of Cell 4 was performed to estimate the cut and fill quantities. For this cell, cutting material above EL +26.25 ft and filling low areas and ditches to EL +24.5 ft was required to achieve the above criteria. Calculations were performed using Land Development Desktop and topographic survey information. Assuming Cell 4 topography is representative of the entire STA area, quantity estimates were proportioned using Cell area as a percentage of total STA area. To grade all of the STA cells, 3 million cubic yards will be required for fill, and 1.6 million cubic yards will be generated from cut within the cells (available fill). A total of 1.4 million cubic yards of additional fill would be required to obtain desired grading, which will be available from adjacent canal excavations.

The available aerial photogrammetric survey for the site is only accurate to ± 0.5 ft because of the presence of the citrus groves. This survey can be used to estimate cut/fill quantities, but it can not be used to develop a final grading plan. A new photogrammetric survey is required after removal of the citrus groves to increase the level of accuracy to ± 0.2 ft. The photogrammetric survey can not be performed until after submission of the final plans and award of the STA contract, since the trees will not be cleared until that time. An adjustment in the STA cell cut and fill quantities may be required as a result of this survey.

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2.0 LIST OF DRAWINGS

This section presents the list of drawings that have been proposed for the Reservoir Stormwater and Treatment Area Preliminary Design Phase. The drawings are being provided separately on full and half-size sets as specified in the Districts Work Order No. 12. The drawing list presented below is broken down as follows:

- By Major Division of the Project
- By Discipline including
    - Drawing Identities
    - Drawing Description
    - Number of Drawings

Reservoir

GENERAL	Drawing Title
G1001	Cover Sheet and Location Map
G1002	Sheet Index
G1003	General Notes, Legend and Abbreviations
G1004	Key Sheet
G1005	Site Access Plan
G1006	Horizontal and Vertical Control Sheet

CIVIL	Drawing Title
C1001	Project Limit Coordinates
C1002	Site Exploration Plan
C1003	Soils Classification Legend
C1004	Intake Canal Boring Logs
C1005	Reservoir Centerline Boring Logs
C1006	Reservoir Centerline Boring Logs
C10O7	Reservoir Centerline Boring Logs
C1008	Reservoir Centerline Boring Logs
C1009	Reservoir Centerline Boring Logs
C1010	Reservoir Centerline Boring Logs
C1011	Reservoir Interior Boring Logs
C1012	Reservoir Interior Boring Logs
C1013	Reservoir Exterior Boring Logs
C1014	Reservoir Exterior Boring Logs
C1015	Reservoir Exterior Boring Logs
C1016	Demolition Plan
C1017	Demolition Plan
C1018*	Demolition Plan
C1019*	Borrow Area Plan
C1020*	Borrow Area Plan
C1021*	Borrow Area Plan

CIVIL	Drawing Title
C1022*	Borrow Area Plan
C1023*	Borrow Area Plan
C1024*	Borrow Area Plan
C1025*	Borrow Area Plan
C1026*	Borrow Area Plan
C1027*	Borrow Area Plan
C1028	Borrow Area Plan
C1029*	Borrow Area Plan
C1030*	Borrow Area Plan
C1031*	Borrow Area Plan
C1032	Intake Canal Plan and Profile
C1033	Intake Canal Plan and Profile
C1034	Intake Canal Plan and Profile
C1035	Intake Canal Plan and Profile
C1036	Intake Canal Plan and Profile
C1037	Intake Canal Plan and Profile
C1038	Intake Canal Plan and Profile
C1039	Intake Canal Plan and Profile
C1040	Intake Canal Plan and Profile
C1041	Intake Canal Cross-Section Locations
C1042	Intake Canal Cross-Section Locations
C1043	Intake Canal Cross-Sections
C1044	Intake Canal Cross-Sections
C1045	Reservoir Plan and Profile
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C1050	Reservoir Plan and Profile
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C1060	Reservoir Plan and Profile
C1061	Reservoir Plan and Profile
C1062	Reservoir Plan and Profile
C1063	Reservoir Plan and Profile
C1064	Reservoir Plan and Profile
C1065	Reservoir Cross-Section Locations
C1066	Typical Embankment Cross-Section
C1067	Reservoir Cross-Sections
C1068	Reservoir Cross-Sections

CIVIL	Drawing Title
C1069	Reservoir Cross-Sections
C1070	Typical Embankment Turnout
C1071	Typical Exterior Embankment Access
C1072*	Typical Interior Embankment Access
C1073	Discharge Structure Plan
C1074	Discharge Structure Cross-Section
C1075	Seepage Collection Canal Discharge Structure Plan And Sections
C1076	Civil Details
C1077	Civil Details
C1078*	Civil Details
C1079*	Civil Details
C1080*	Civil Details
C1081*	Civil Details
C1082*	Civil Details
C1083*	Civil Details
C1084*	Civil Details

STRUCTURAL	Drawing Title
S1001	Discharge Structure Plan and Section
S1002*	Discharge Structure Sections
S1003*	Discharge Structure Wingwall Plan and Section
S1004*	Discharge Structure Wingwall Details
S1005	Discharge Structure Culvert Plan and Section
S1006*	Discharge Structure Culvert Details
S1007*	Distribution Canal Wingwall Plan and Section
S1008*	Distribution Canal Wingwall Details
S1009	Access Bridge Plan
S1010	Access Bridge Sections
S1011*	Access Bridge Details
S1012	Access Bridge Abutment Plan and Sections
S1013*	Access Bridge Abutment Details
S1014*	Seepage Collection Canal Spillway Plan
S1015*	Seepage Collection Canal Spillway Sections
S1014*	Seepage Collection Canal Details
S1009*	Details
S1009*	Details
S1009*	Details

MECHANICAL	Drawing Title
M1001	Legend
M1002*	Details

INSTRUMENTATION & CONTROLS	Drawing Title
IC1001	Legend
IC1002	Reservoir and Discharge Structure
IC1003	Reservoir Seepage Canal Structure
IC1004	Stilling Well Details
IC1005	Stilling Well Details
IC1006	Details Sheet 1
IC1007	Details Sheet 2

ELECTRICAL	Drawing Title
E1001	Legend and Notes
E1002	Control Room One-Line Diagrams
E1003	Power, Lighting and Grounding Plan
E1004	Control Rooms/Electrical Load Summary
E1005	Details
E1006	Details
E1007	Details

*Not included in this submittal package

Stormwater Treatment Area

GENERAL	Drawing Title
G2001	Cover Sheet and Location Map
G2002	Sheet Index
G2003	Notes, Legend and Abbreviations
G2004	Site Access Plan
G2005	Horizontal and Vertical Control Plan

CIVIL	Drawing Title
C2001	Contract Limit Coordinates
C2002	Site Exploration Plan
C2003	Soils Classification Legend
C2004	Cell 1 Boring Logs
C2005	Cell 1 Boring Logs
C2006	Cell 1 Boring Logs
C2007	Cell 2 Boring Logs
C2008	Cell 2 Boring Logs
C2009	Cell 2 Boring Logs
C2010	Cell 3 Boring Logs
C2011	Cell 4 Boring Logs
C2012	Cell 5 Boring Logs
C2013	Cell 6 Boring Logs
C2014	Cell 7 Boring Logs
C2015*	Demolition Plan
C2016*	Demolition Plan
C2017*	Borrow Area Plan
C2018*	Borrow Area Plan
C2019	Key Sheet
C2020	Cell 1 Plan
C2021	Cell 1 Plan
C2022	Cell 1 Plan
C2023	Cell 1 Plan
C2024	Cell 1 Plan
C2025	Cell 1 Plan
C2026	Cell 1 Plan
C2027	Cell 1 Plan
C2028	Cell 1 and 2 Plan
C2029	Cell 1 and 2 Plan
C2030	Cell 2 Plan
C2031	Cell 2 Plan
C2032	Cell 2 Plan
C2033	Cell 2 Plan
C2034	Cell 2 Plan
C2035	Cell 2 Plan

CIVIL	Drawing Title
C2036	Cell 2 Plan
C2037	Cell 2 Plan
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C2039	Cell 2 Plan
C2040	Cell 2 Plan
C2041	Cell 2 Plan
C2042	Cell 3 Plan
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C2052	Cell 4 Plan
C2053	Cell 4 Plan
C2054	Cell 4 Plan
C2055	Cell 4 and 5 Plan
C2056	Cell 4 and 5 Plan
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C2078	Cell 7 Plan
C2079	Cell 7 Plan
C2080	Cell 7 Plan
C2081	Cell 7 Plan
C2082	Eastern Outlet Canal Plan

CIVIL	Drawing Title
C2083	Cell 7 Plan
C2084	Western Outlet Canal Plan
C2085	Cross-Section Locations - North
C2086	Cross-Section Locations - South
C2087	Typical Cell Cross-Sections
C2088	Cross-Sections
C2089	Cross-Sections
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C2095	Western Outlet Canal Cross-Sections
C2096	Eastern Outlet Canal Cross-Sections
C2097	Typical Weir Outlet Structure
C2098	Typical Low-Level Gated Outlet
C2099	Typical Gated Control Structure
C2100	Distribution Canal Spillway
C2101	Western Outlet Canal Structure Plan and Sections
C2102	Eastern Outlet Canal Structure Plan and Sections
C2103	Details
C2104*	Details
C2105*	Details
C2106*	Details
C2107*	Details

STRUCTURAL	Drawing Title
S2001*	Weir Outlet Plan
S2002*	Weir Outlet Sections
S2003*	Weir Outlet Details
S2004*	Low-Level Gated Outlet Plan
S2005*	Low-Level Gated Outlet Sections
S2006*	Low-Level Gated Outlet Details
S2007*	Gated Control Structure Plan
S2008*	Gated Control Structure Sections
S2009*	Gated Control Structure Details
S2010*	Distribution Canal Spillway Plan
S2011*	Distribution Canal Spillway Sections
S2012*	Distribution Canal Spillway Details
S2013*	Western Outlet Canal Structure Plan
S2014*	Western Outlet Canal Structure Sections
S2015*	Western Outlet Canal Structure Details
S2016*	Eastern Outlet Canal Structure Plan

STRUCTURAL	Drawing Title
S2017*	Eastern Outlet Canal Structure Sections
S2018*	Eastern Outlet Canal Structure Details

MECHANICAL	Drawing Title
M2001	Legend
M2002*	Details

INSTRUMENTATION & CONTROLS	Drawing Title
IC2001	Legend
IC2002	Cells 1 and 2 Sheet 1
IC2003	Cells 1 and 2 Sheet 2
IC2004	Cells 1 and 2 Sheet 3
IC2005	Cell 3
IC2006	Cell 4
IC2007	Cell 5
IC2008	Cell 6
IC2009	Cell 7
IC2010	Discharge Structure
IC2011	RTU Single Stem Slide Gate Details
IC2012	RTU Single Stem Slide Gate With Stilling Well Details
IC2013	RTU Single Stem Slide Gate With Automatic Water Sampler and Stilling Well Details
IC2014	RTU Two Single Stem Slide Gates Details
IC2015	RTU Two Single Stem Slide Gates With Stilling Well Details
IC2016	RTU Two Single Stem Slide Gates With Automatic Water Sampler and Stilling Well Details
IC2017	RTU Two Roller Drum Slide Gates Details
IC2018	RTU Data Logger For Level Details Sheet 1
IC2019	RTU Data Logger For Level Details Sheet 2
IC2020	Automatic Water Sampler Details

ELECTRICAL	Drawing Title
E2001	Legend and Notes
E2002	One-Line Diagrams

ELECTRICAL	Drawing Title
E2003	One-Line Diagram
E2004	Site Electrical Distribution Plan
E2005	Control Rooms/Electrical Load Summary
E2006	Details
E2007	Details
E2008	Details

*Not included in this submittal package

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3.0 LIST OF DESIGN CALCULATIONS

This section presents the list of design calculations that has been prepared for the Reservoir and STA package.

Civil

- Hydraulics
  - Reservoir Intake Canal
  - Reservoir Seepage Collection Canal
  - Reservoir Seepage Collection Canal Discharge Structure
  - Reservoir Eastern Seepage Drainage Canal
  - Reservoir Embankment Seepage Collection Pipe
  - Reservoir Discharge Structure
  - Distribution Canal and Overflow Spillway
  - STA Cell Gated Inlet Structure
  - STA Cell Weir Outlet Structure
  - STA Cell Discharge Outlet Culverts
  - STA Cell Low Level Gated Outlet Structures
  - STA Cell Seepage Collection Canal
  - Site Drainage Canals
  - System Discharge Structures
    - System Gated Discharge Structure on Western Outlet Canal
    - Western Outlet Canal and Overflow System Discharge Structure
  - Eastern Drainage Canal
  - Eastern Outlet Canal and Discharge Structure
  - Project Access Road
- Earthwork
  - Access Road Design Criteria
  - Reservoir Intake Canal
  - Reservoir Area
  - Reservoir Crest Width (12 ft vs. 16 ft)
  - STA Cells Area

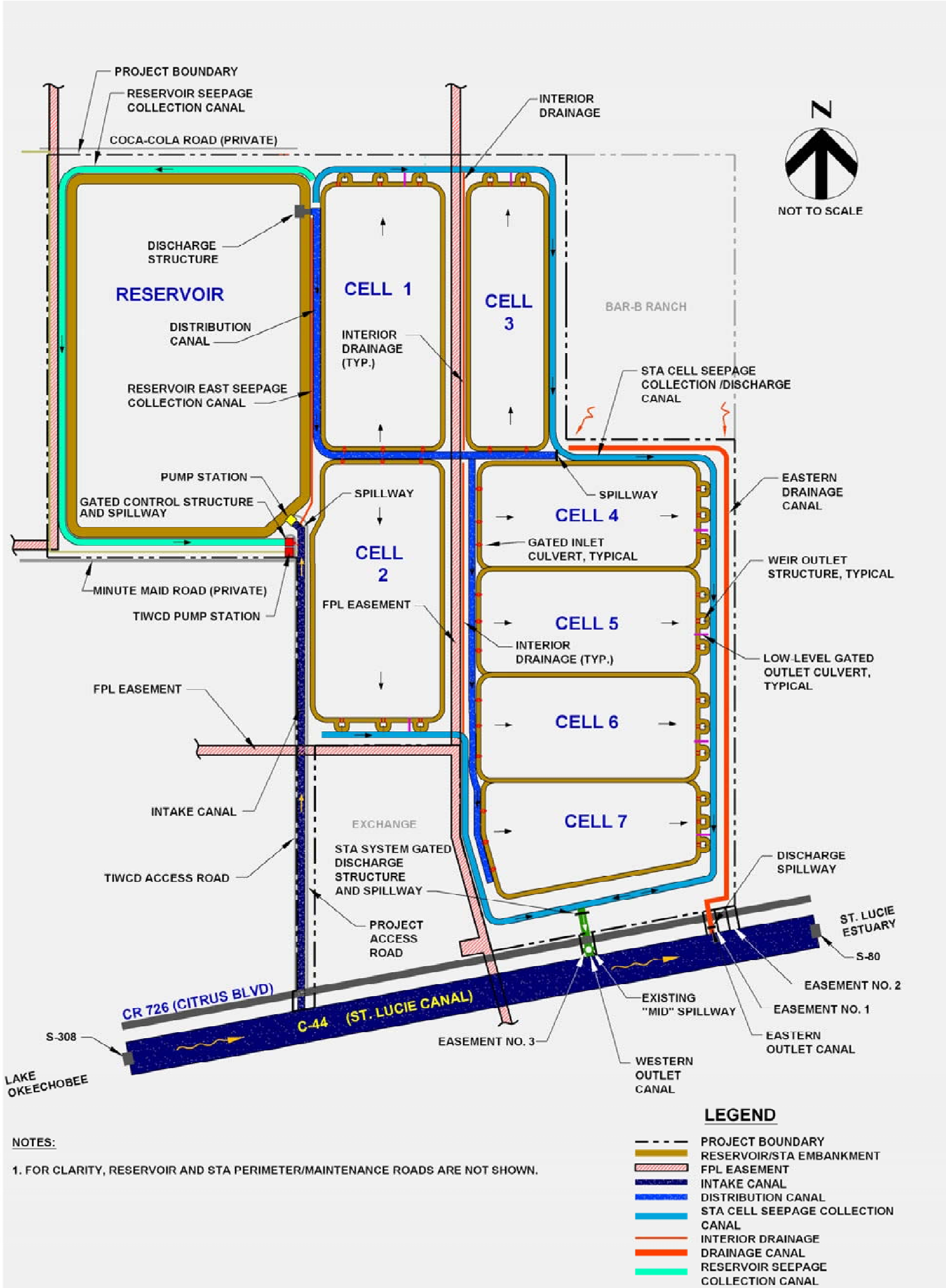
Geotechnical

- Reservoir Embankment Crest Elevation
- Intake Canal Seepage and Slope Stability
- Reservoir Embankment Seepage and Slope Stability
- STA Embankment and Canal Seepage and Slope Stability
- Reservoir Embankment Settlement Analysis

Structural

- Discharge Structure

FIGURES



NOTES:

1. FOR CLARITY, RESERVOIR AND STA PERIMETER/MAINTENANCE ROADS ARE NOT SHOWN.

Source: C-44_SCHEMATIC_LAYOUT_PRELIM_DESIGN_09_070306.tif

File Name: Figure3.1_ProjLayout_062206_dmd.grf

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2202 N. WEST SHORE BLVD.
SUITE 250
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Project Layout Schematic

C-44 Reservoir/STA Project
Preliminary Design Report
Contract# CN040918-WO12

DATE
07/6/2006

FIGURE
1.1